SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-45

Name: Newell Lake **County**: Butte

Legal description: T 10N, R 6E Sec. 9
Location from nearest town: 8 miles north and 2 miles east of Newell, SD
Dates of present survey: July 22-24, September 26, 2012
Date last surveyed: July 25-27, September 22, 2011
Management classification: Warm-water permanent

Primary Species: (game and forage)	Secondary and other species:
1. Largemouth Bass	1. Smallmouth Bass
2. Bluegill	2. European Rudd
3. Northern Pike	3. White Sucker
4. Yellow Perch	4. Black Bullhead
5. Walleye	5.

PHYSICAL CHARACTERISTICS

Surface Area: 183 acres **Watershed**: 7,680 acres
Maximum depth: 32 feet **Mean depth**: 13.6 feet
Lake elevation at survey (from known benchmark): Four feet below full-pool

Ownership of lake and adjacent lakeshore property:

The Department of Game, Fish and Parks owns Newell Lake, as well as the surrounding property. The shoreline is managed as a recreation area and a game production area.

Fishing Access

Anglers must drive 2 miles along a maintained gravel road to access Newell Lake. Gravel roads and trails also allow access to the south and northwest shorelines. Shore fishing is generally good with open shorelines. A boat ramp and dock are located on the south east side of the lake.

Observations of Water Quality and Aquatic Vegetation

The area has been negatively affected by the recent drought and heavy cattle grazing. Submerged aquatic vegetation in Newell Lake consists of coontail and cattail. Summer months are often characterized as having large amounts of vegetation in the shallow bays and inlets. Emergent vegetation consists of bulrush and cattail.

Observations on condition of all structures (i.e. spillway, level regulators, boat ramps, etc)

In 1998, following the lake survey, major damage occurred to the tubes that required rebuilding the spillway. Work on the spillway was completed in 1999. The spillway, dam and boat ramp are in good condition. At the time of the survey, low water made the boat ramp barely useable.

MANAGEMENT OBJECTIVES

Objective 1. Maintain a Walleye fishery with a minimum gill-net CPUE-S equal to or greater than 10 and a PSD range of 30-60.

Objective 2. Maintain a Largemouth Bass fishery with a minimum night-time electrofishing CPUE-S of 20, PSD greater than 50, and PSD-P greater than 30.

Objective 3. Maintain Bluegill trap net CPUE-S greater than 20, PSD at least 20 and PSD-P of 5 or greater.

BIOLOGICAL DATA

A lake survey was conducted at Newell Lake July 22-24, 2012. Sampling consisted of two experimental gill (gill) (45.7 m [150 ft] long and 1.8 m [6 ft] deep with six 7.6 m [25 ft] panels of bar mesh sizes: 12.7 mm [0.5 in], 19.1 mm [0.75 in], mm [1.25 in], 38.1 mm [1.5 in], and 50.8 mm [2.0 in]) and eight modified fyke (trap) consisting of 1.3 X 1.5 m frame, 19.1 mm (0.75 in) mesh and a 1.2 X 23 m (3.9 X 75.5 ft) lead, nets (Figure 1, Tables 1 and 2). Nighttime boat electrofishing was completed at Newell Lake on September 26, 2012 (Table 3). Discussion on selected fish species follows and completes this report.

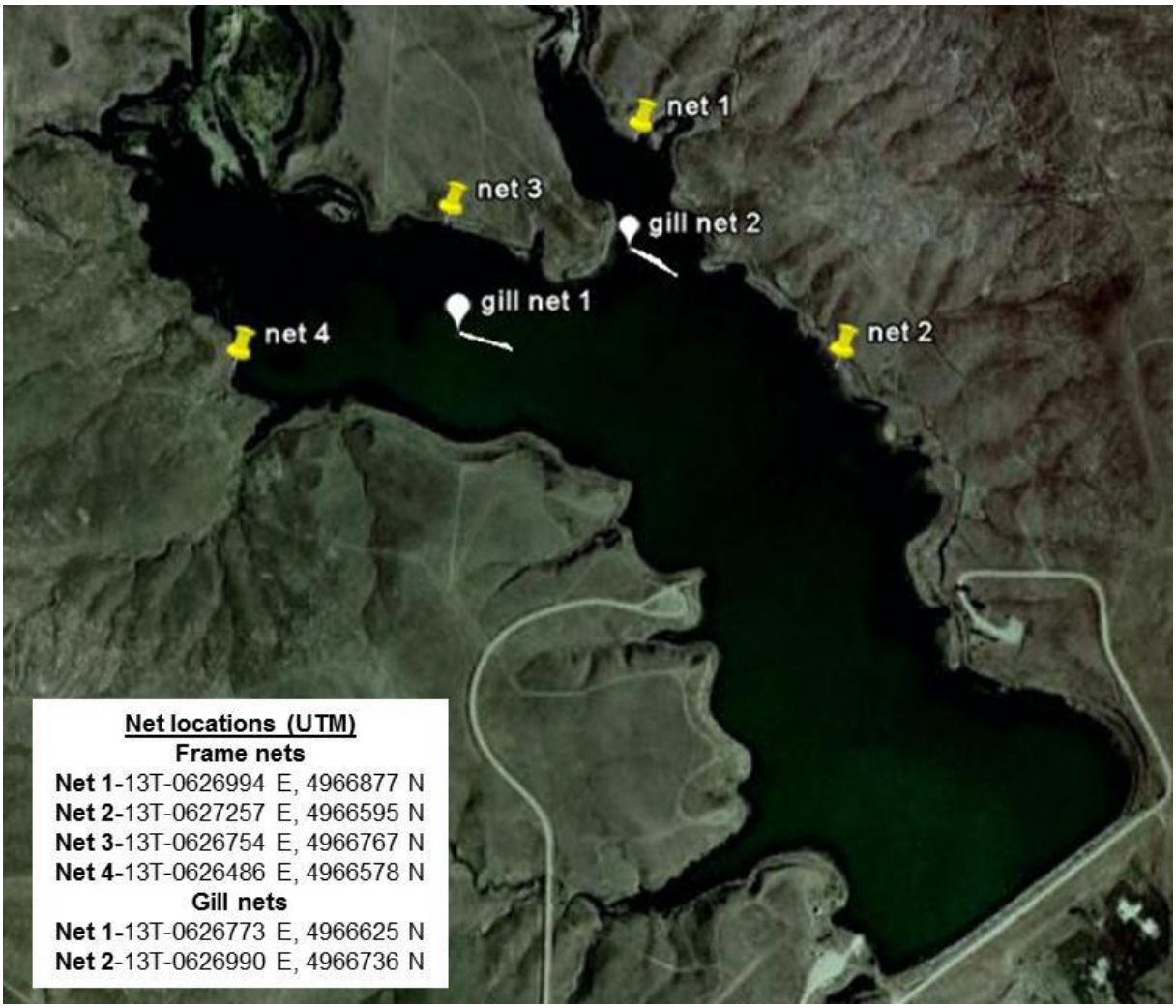

Figure 1. Locations, with GPS coordinates, of experimental gill (gill net) and modified fyke (net) nets during the fisheries survey of Newell Lake, Butte County, South Dakota, 2012.

Table 1. Species, number capture (N), catch per unit effort (CPUE), catch per net night of stock-length fish (CPUE-S), proportional stock density (PSD) , proportional stock density of preferred-length fish (PSD-P)and relative weight of stock length or greater fish (*Wr*>S) from all fish species collected in eight modified fyke nets in Newell Lake, Butte County, South Dakota, July 22-24, 2012. CPUE values with 80% confidence intervals in parentheses. PSD, PSD-P and *Wr* ≥ S values with 90% confidence intervals in parentheses.

Species	N	CPUE	CPUE-S	PSD	PSD-P	*Wr* ≥ S
Black Bullhead	10	1.3 (0.8)	1.3 (0.8)	100	60 (30)	81.9 (1.0)
Bluegill	172	21.5 (6.8)	21.5 (6.8)	93 (4)	20 (6)	106.4 (0.6)
Northern Pike	9	1.1 (0.4)	1.0 (0.5)	25 (31)	0	78.3 (3.6)
European Rudd	123	15.4 (9.6)	15.4 (9.6)	62 (7)	26 (7)	--
Walleye	6	0.8 (0.6)	0.6 (0.5)	0	0	80.4 (3.4)
White Sucker	12	1.5 (0.8)	1.5 (0.8)	100	100	82.3 (3.7)
Yellow Perch	1	0.1 (0.2)	0.1 (0.2)	--	--	87.5 (--)
Total	333					

Table 2. Species, number capture (N), catch per unit effort (CPUE), catch per net night of stock-length fish (CPUE-S), proportional stock density (PSD) , proportional stock density of preferred-length fish (PSD-P)and relative weight of stock length or greater fish (*Wr*>S) from all fish species collected in two experimental gill nets in Newell Lake, Butte County, South Dakota, July 22-24, 2012. CPUE values with 80% confidence intervals in parentheses. PSD, PSD-P and *Wr* ≥ S values with 90% confidence intervals in parentheses.

Species	N	CPUE	CPUE-S	PSD	PSD-P	*Wr* ≥ S
Bluegill	1	0.5 (1.5)	0.5 (1.5)	--	--	104.6 (--)
Northern Pike	7	3.5 (4.6)	3.5 (4.6)	71 (35)	14 (28)	83.5 (6.1)
European Rudd	115	57.5 (13.9)	37.0 (49.2)	73 (9)	45 (10)	--
Walleye	25	12.5 (7.7)	12.5 (7.7)	32 (16)	0	77.5 (1.0)
White Sucker	5	2.5 (7.7)	2.5 (7.7)	100 (--)	100	93.5 (3.9)
Yellow Perch	7	3.5 (1.5)	3.5 (1.5)	43 (39)	0	92.7 (3.8)
Total	160					

Table 3. Species, number capture (N), catch per unit effort (CPUE), catch per net night of stock-length fish (CPUE-S), proportional stock density (PSD) , proportional stock density of preferred-length fish (PSD-P)and relative weight of stock length or greater fish (*Wr*>S) from all fish species collected during 50 minutes of boat electrofishing at Newell Lake, Butte County, South Dakota, September 26, 2012. CPUE values with 80% confidence intervals in parentheses. PSD, PSD-P and *Wr* ≥ S values with 90% confidence intervals in parentheses.

Species	N	CPUE	CPUE-S	PSD	PSD-P	*Wr* ≥ S
Largemouth Bass	37	44.4 (14.7)	30.0 (7.7)	32 (16)	32 (16)	111.3 (3.1)
Smallmouth Bass	1	1.2 (1.8)	1.2 (1.8)	--	--	109.4 (--)
Walleye	39	46.8 (20.9)	31.2 (18.9)	23 (14)	0	86.9 (1.7)
Total	77					

Bluegill

Bluegill were the most abundant game fish sampled in Newell Lake with a trap net CPUE of 21.5 (Table 1), which increased from 5.5 in 2011 and shows the first increase since 2007 (Table 4). Bluegill density is consistent with management objectives and size objectives are exceeding the current management objectives with a proportional stock density (PSD) of 93 and a proportional stock density of preferred-length fish (PSD-P) of 20. Fish condition of adult Bluegill remains stable, with a mean relative weight for stock-length and larger fish (*Wr*>S) of 106.4, similar to last year at 104.3. Length frequency histograms indicate few bluegills under quality length (Figure 2). This would suggest low recruitment may be a concern in the future for fisheries managers, but length frequency histograms from past years indicate this appears to be typical of this population.

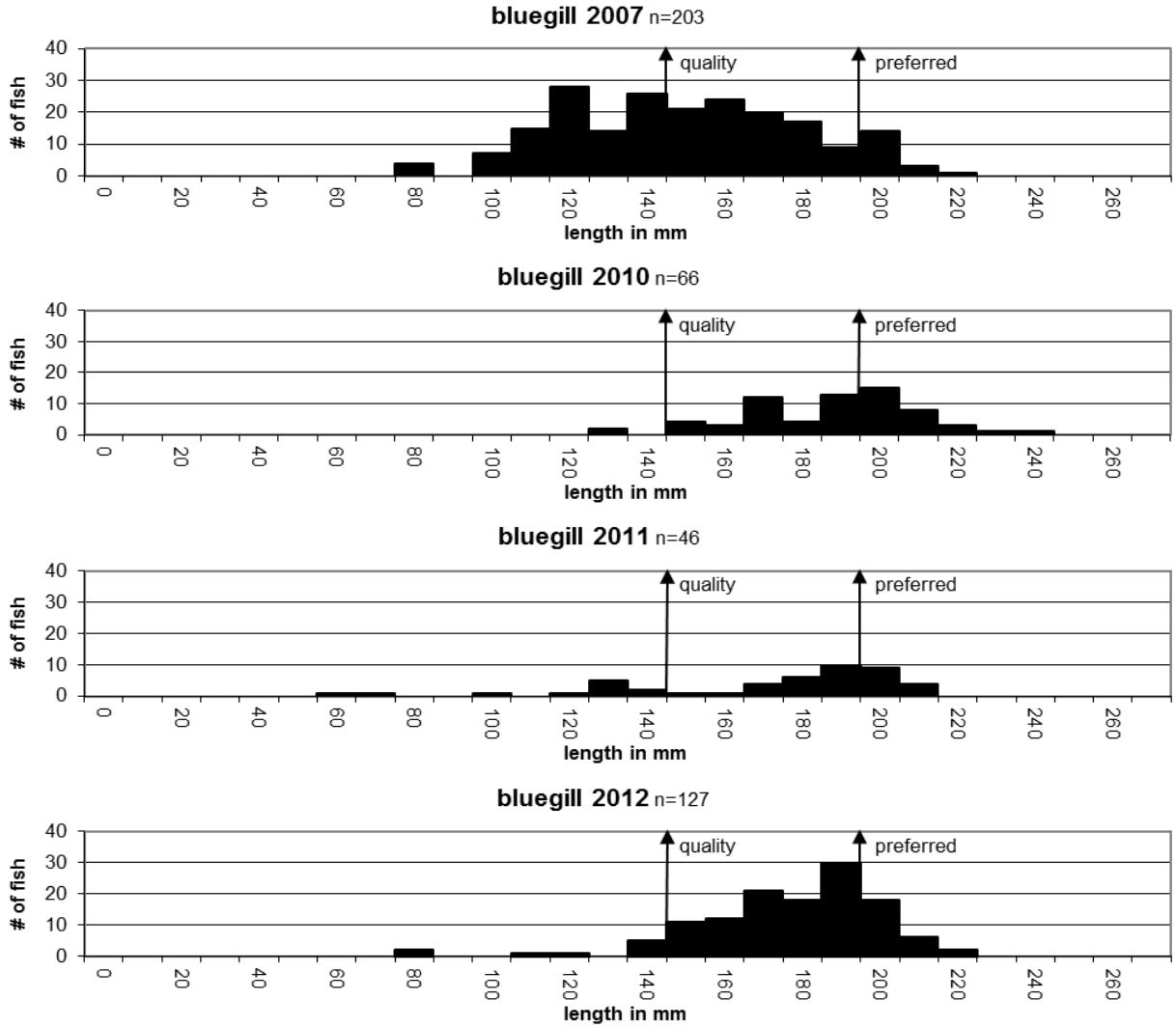

Figure 2. Length frequency histograms of Bluegill collected in modified fyke nets in Newell Lake, Butte County, South Dakota, 2007, 2010-2012.

European Rudd

European Rudd were the second most abundant species sampled in trap nets, with a catch per unit effort (CPUE) of 15.4 (Table 1). Catch per unit effort has remained relatively stable since the early 2000's (Table 4). Size structure of European Rudd has changed substantially since 2007 as analysis indicates the presence of multiple year classes and consistent recruitment (Figure 3). Currently, Largemouth Bass density is low, which may be part of the reason European Rudd recruitment has been so successful. Increasing management efforts on predator abundance including Largemouth and Smallmouth Bass stockings may aid in reducing European Rudd densities.

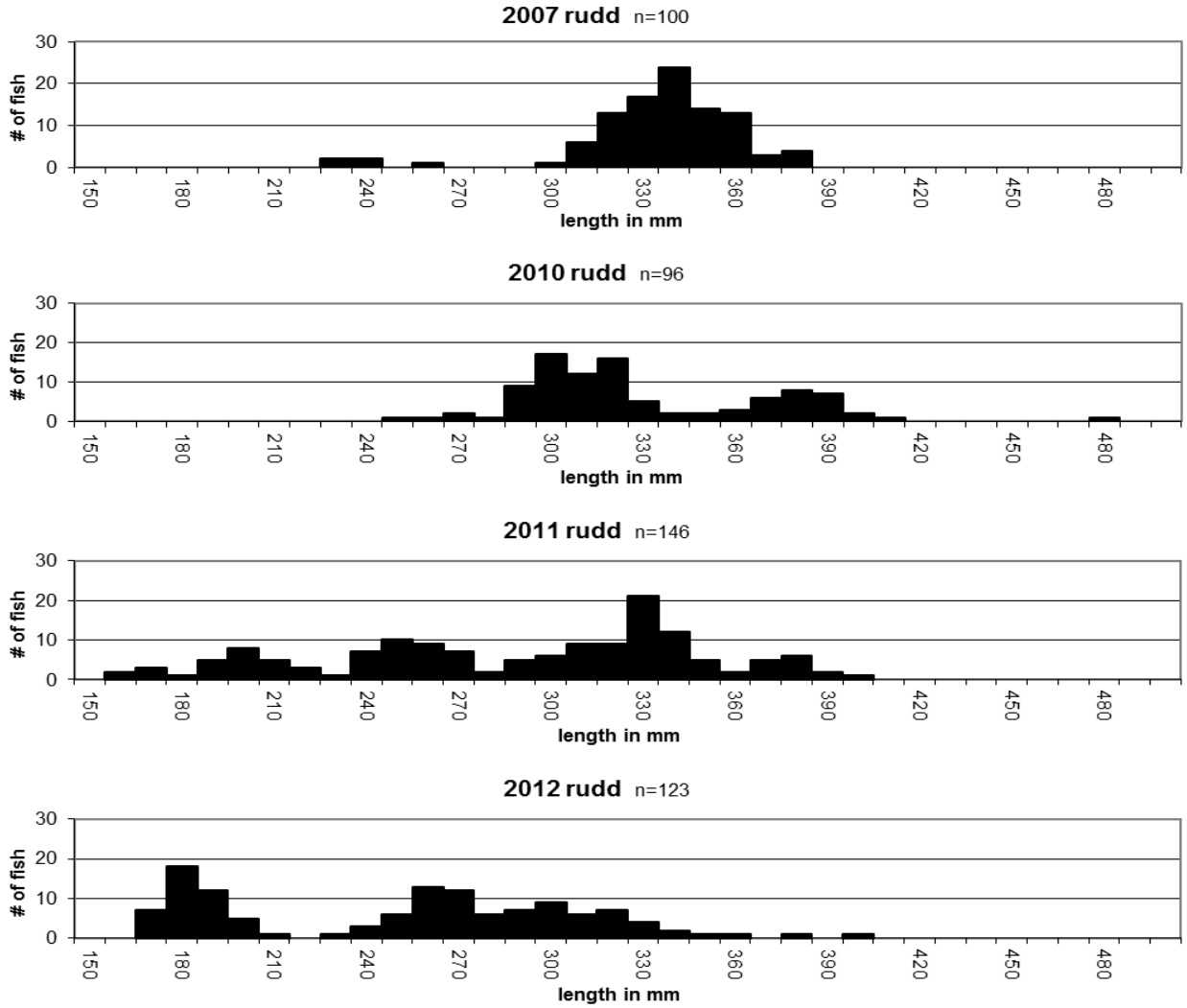

Figure 3. Length frequency histograms of European Rudd collected in modified fyke nets in Newell Lake, Butte County, South Dakota, 2007, 2010-2012.

Table 4. Year, number captured (N) and catch per unit effort (CPUE; 80% confidence intervals are given in parentheses), for European Rudd collected in modified fyke nets in Newell Lake, Butte County, South Dakota, 2002, 2004, 2006, 2007, 2010- 2012.

Year	N	CPUE
2002	144	18.6 (6.4)
2004	53	21.6 (11.9)
2006	173	7.6 (3.4)
2007	130	18.0 (9.2)
2010	96	12.0 (6.4)
2011	146	18.3 (5.8)
2012	123	15.4 (9.6)

Largemouth Bass

In an effort to improve size structure of Largemouth Bass within Newell Lake, a 12 to 16 inch protective slot length limit with a one fish daily over 16 inches was put in effect in 2004. In 2010, the protective slot length limit was increased to 14 to 18 inches and only one Largemouth Bass over 18 inches could be kept as part of the daily limit.

The 2007 electrofishing sample had a CPUE for stock-length and larger fish of 55.2 Largemouth Bass per hour, which is the highest recorded in recent years (Tables 3 and 5). Stock density indices were also near record levels with a PSD of 73 and a PSD-P of 23. High runoff in 2008 filled the lake and created very turbid water which made sampling impossible in 2008 and 2009. In 2010, catch rates were the lowest recorded since 2000 with a CPUE of 4.7 fish per hour. The 2011 survey showed a continued low density population with little to no recruitment, CPUE was 15.0, and all fish sampled were over preferred length (Figure 4). After stocking adult Largemouth Bass during the summer of 2012, catch rates have risen to a CPUE of 44.4, surpassing the management objective. Condition was excellent with an mean *Wr*≥S of 111.3.

Table 5. Year, number sampled (N), pedal time (seconds), catch per hour of electrofishing (CPUE and CPUE-S), proportional stock densities (PSD, PSD-P; 90% confidence intervals are given in parentheses) and relative weight of fish stock length or greater (*Wr* ≥ S; 80%Confidence Interval's) for Largemouth Bass collected by nighttime boat electrofishing in Newell Lake, Butte County, South Dakota, 2004-2012.

Year	N	Pedal Time (seconds)	CPUE	CPUE-S	PSD	PSD-P	*Wr*≥S
2004	31	3,600	31.0 (13.4)	28.0 (12.0)	36 (16)	18 (13)	108.1 (1.6)
2005	23	3,894	21.7 (9.1)	18.0 (6.0)	32 (19)	0	101.2 (1.4)
2006	36	3,800	35.5 (16.0)	30.8 (13.8)	42 (--)	16 (--)	114.3 (2.2)
2007	69	3,650	67.9 (15.8)	55.2 (15.1)	73 (10)	23 (10)	117.2 (1.3)
2010	6	4,098	4.7 (2.7)	4.7 (2.7)	--	--	114.8 (5.2)
2011	15	3,600	15.0 (9.1)	15.0 (9.1)	100	100	103.0 (2.6)
2012	37	3,000	44.4 (14.7)	30.0 (7.7)	32 (16)	32 (16)	111.3 (3.1)

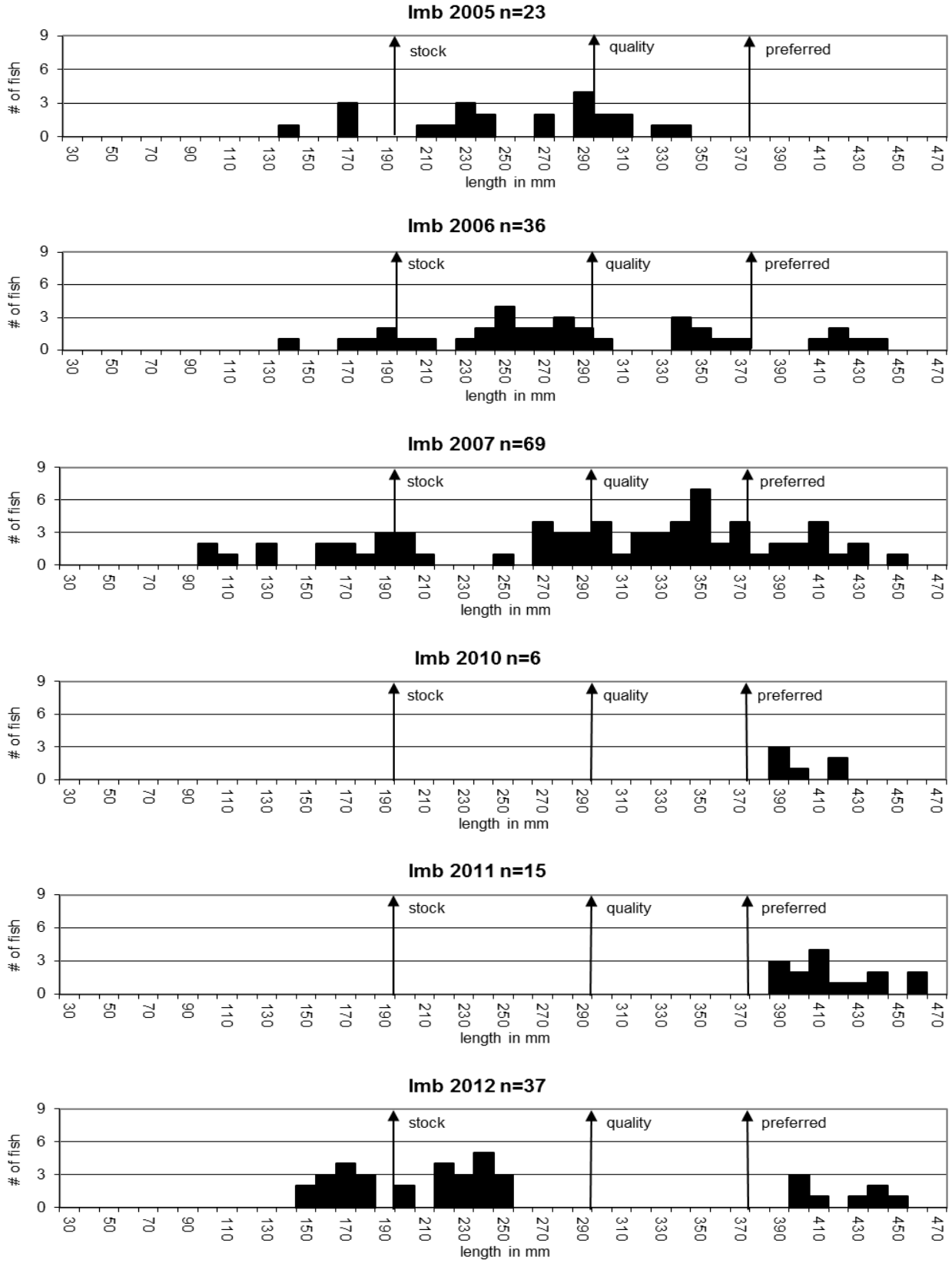

Figure 4**.** Length frequency histograms of Largemouth Bass collected by nighttime boat electrofishing in Newell Lake, Butte County, South Dakota 2005-2007, 2010-2012.

Walleye

Walleye were the only game fish species to show any increase in abundance since the 2007 survey. In attempt to increase Walleye density, a 15-inch minimum with a daily limit of two Walleye was placed on Newell Lake on January 1, 2010. In addition to the regulation, 50,000 fingerlings have been stocked annually from 2007-2009. Increased Walleye density could potentially keep Bluegill and European Rudd density low.

Size structure is a little lower than management objectives. During the 2012 electrofishing survey, 39 Walleye were sampled yielding a PSD of 23 with a PSD-P of 0 (Table 6). This indicates a young population, possibly due to recent stockings. Gill net CPUE was higher than previous years (Table 7) and is within management objectives. The length frequency histograms indicate some possible natural reproduction, as no fingerlings have been stocked since 2009 (Figure 5). Age and growth data shows a strong 2009 year class, probably from the large stocking, with fairly slow growth (Table 8).

Table 6. Species, number capture (N), catch per unit effort (CPUE), catch per net night of stock-length fish (CPUE-S), proportional stock density (PSD) , proportional stock density of preferred-length fish (PSD-P) and relative weight of stock length or greater fish (*Wr*>S) for Walleye collected by nighttime boat electrofishing in Newell Lake, Butte County, South Dakota, 2004-2007, 2010-2012. CPUE values with 80% confidence intervals in parentheses. PSD, PSD-P and *Wr*>S values with 90% confidence intervals in parentheses.

Year	N	CPUE	CPUE-S	PSD	PSD-P	*Wr*>S
2004	11	11.0 (5.3)	10.0 (5.9)	80 (24)	0	84.7 (2.2)
2005	16	16.4 (7.5)	14.7 (8.1)	19 (17)	6 (11)	78.9 (1.6)
2006	29	26.8 (5.7)	24.8 (5.5)	33 (16)	4 (6)	87.9 (0.9)
2007	69	67.1 (22.1)	23.9 (17.0)	32 (16)	4 (7)	96.1 (1.6)
2010	102	77.5 (35.7)	18.1 (10.4)	25 (15)	4 (7)	85.2 (1.2)
2011	68	68.0 (17.7)	46.0 (15.3)	15 (9)	0	87.5 (1.0)
2012	39	46.8 (20.9)	31.2 (18.9)	23 (14)	0	86.9 (1.7)

Table 7. Year and catch per unit effort by gear type (CPUE with 80% CI's) for Walleye collected during fisheries surveys in Newell Lake, Butte County, South Dakota, 2002–2007, 2010-2012.

Year	Gill net	Trap net	Fall electrofishing
2002	2.0 (3.1)	1.1 (0.6)	------
2004	6.0 (9.2)	0.1 (0.2)	11.0 (5.3)
2005	------	------	16.4 (7.5)
2006	0.5 (1.5)	0.4 (0.4)	26.8 (5.7)
2007	2.0 (3.1)	2.6 (1.3)	67.1 (22.1)
2010	11.5 (7.7)	2.4 (0.8)	77.5 (35.7)
2011	4.0 (9.2)	1.0 (0.5)	68.0 (17.7)
2012	12.5 (7.7)	0.8 (0.6)	46.8 (20.9)

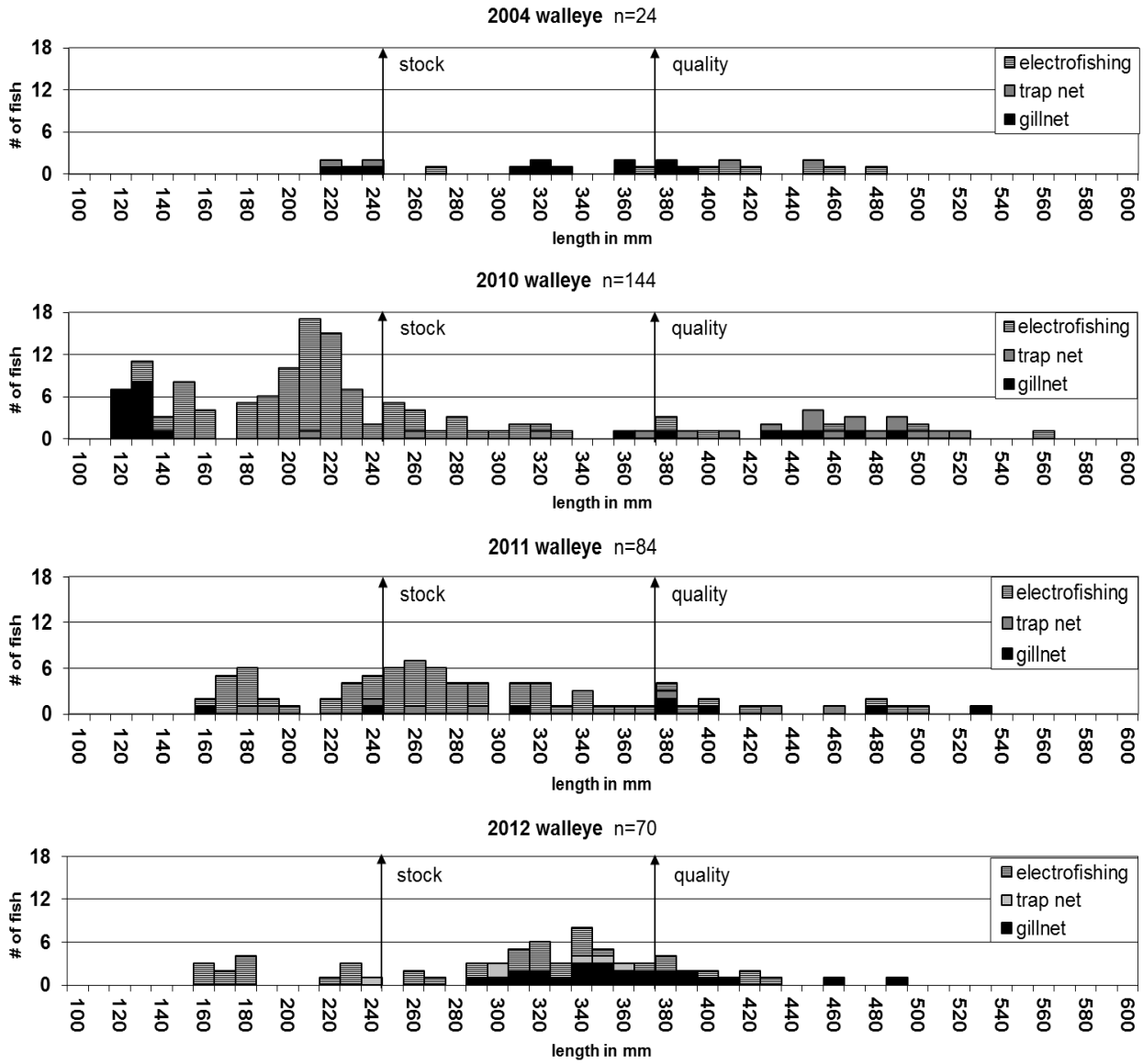

Figure 5. Lengths frequency histograms of Walleye collected from nighttime boat electrofishing (electrofishing), experimental gill (gillnet) and modified fyke (trap net) nets at Newell Lake, Butte County, South Dakota, 2007, 2010-2012.

Table 8. Age, walleye minimum, maximum and weighted mean lengths (mm) at capture by age (determined from otoliths), and number sampled for Walleye sampled in experimental gill nets in Newell Lake, Butte County, South Dakota, 2012.

Age	Minimum length @ capture	Weighted mean length @ capture	Maximum length @ capture	Number of fish in survey
3	299	329	352	10
4	312	354	376	7
5	381	407	496	6
7	419	419	419	1
9	462	462	462	1

RECOMMENDATIONS

1. Conduct standard fish netting surveys every 1 to 3 years to monitor fish populations.

2. Sample Largemouth Bass, Smallmouth Bass and Walleye annually with nighttime boat electrofishing to identify population changes and effectiveness of special regulations.

3. Stock adult Largemouth Bass and or advanced fingerlings when available to supplement the existing population.

APPENDIX

Appendix A. Stocking history, including year, number stocked, species and size of fish stocked into Newell Lake, Butte County, South Dakota, 2003-2012.

Year	Number	Species	Size
2003	1,120	Walleye	Large fingerling
2004	308	Walleye	Large fingerling
2005	2,230	Walleye	Large fingerling
2006	180	Largemouth Bass	Adult
	187	Walleye	Large fingerling
2007	50,000	Walleye	Small fingerlings
2008	53,975	Walleye	Small fingerlings
2009	54,100	Walleye	Small fingerlings
2012	5,130	Smallmouth Bass	Small-fingerlings
	9,120	Largemouth Bass	Small-fingerlings
	540	Largemouth Bass	Adult